

PATENT APPLICATION

ASEPTIC EYEDROPPER AND METHOD FOR ITS USE

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ASEPTIC EYEDROPPER AND METHOD FOR ITS USE

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention. The present invention relates generally to medical
5 apparatus and methods. More particularly, the present invention relates to eyedropper
construction and methods for using eyedroppers to deliver drops to the inner corner of a
patient's eye.

[0002] Many if not most people find dispensing eyedrops into their own eyes to be an
uncomfortable procedure. Many people blink or shake as the drops are released from the
10 conventional eyedropper, often leading to incomplete delivery of the irrigant lubricant or
medication.

[0003] Despite many attempts to provide improved systems, the most common technique
for self-dispensation of eyedrops remains use of a dropper bottle. The patient turns his or her
eyes upwardly, locates a dispensing nozzle of the dropper over the eye, and squeezes the
15 bottle to dispense the drop. Sometimes this works. Sometimes this doesn't work.

[0004] Prior attempts at improving eyedroppers and systems are almost too numerous to
mention. Of particular interest to the present invention, a variety of eyedrop dispensing
guides or positioners have been developed. For the most part, these improved guides or
dispensers have been attempts to stabilize and/or position the dispensing nozzle of the
20 dropper or dropper bottle at some predetermined position over the eye. In some cases, the
guides or positioners have further included means for holding the eyelid open in an attempt to
assure that the drop actually enters the eye.

[0005] While potentially being helpful, the location of the dropper or dropper bottle over
the eye still can be disturbing or even daunting to the patient. Moreover, most of these guides
25 or positioners have been threatening, somewhat uncomfortable, cumbersome, unaesthetic,
and awkward to use.

[0006] For these reasons, it would be desirable to provide additional and improved devices
and apparatus for accurately and successfully dispensing drops into a patient's eyes. In
particular, it would be desirable if the apparatus and systems were easy to use, did not require
30 placement of the dispensing bottle or dropper directly over an eye, and could provide

accurate and reproducible delivery of a drop to a particular area of the eye, more particularly the inner corner (medical canthus) of the eye. At least some of these objectives will be met by the invention as described and claimed hereinbelow.

[0007] 2. Description of the Background Art. Patents describing eyedroppers and other devices for directing drops into eyes include U.S. Patent Nos. 6,595,970; 6,325,784; 6,319,240; 5,713,495; 5,665,079; 5,059,188; 4,973,322; 4,960,407; 4,685,906; 4,468,103; 4,257,417; 4,085,750; and 3,934,590. See also published application US 2002/0016576 and design patents D463,550; D457,952; and D369,211. The full disclosures of each of these patents and applications are incorporated herein by reference.

BRIEF SUMMARY OF THE INVENTION

[0008] The present invention provides drop dispensing apparatus and methods intended particularly for delivering drops to an eye from a generally conventional drop applicator, such as a squeeze bottle. In particular, the apparatus comprises a drop dispensing attachment which is adapted to receive drops from such a squeeze bottle and to direct the drops into a patient's eye, particularly to the inner corner of the eye, i.e., the lateral canthus. The drop dispensing attachment may be provided as a separate component which is capable of being attached to an otherwise conventional drop dispensing squeeze bottle. Alternatively, the attachment may be formed as an integral part of such a squeeze bottle or other dispenser and/or may include a special connector which allows the attachment to be removably attached to squeeze bottles or other dispensers having a special mating attachment.

[0009] Droplet dispensing attachments according to the present invention comprise an axial member having an inlet which receives drops from the squeeze bottle and a cross member attached to the axial member. The cross member includes a nose bridge rest which is adapted to rest on the patient's nose bridge. In exemplary embodiments, the nose bridge rest is axially aligned with the axial member and the attached squeeze bottle so that the patient is able to hold the squeeze bottle and advance the nose rest over the patient's own nose bridge so that the bottle is between the eyes, not directly over either eye.

[0010] The cross member of the dispensing attachment further includes at least one leg extending laterally relative to the axial member (usually the nose bridge rest as well). The laterally extending leg has an outlet which is connected to receive drops from the inlet in the axial member. The outlet is further adapted and positioned so that it will release drops from

the outlet into the patient's eye when the rest is positioned over the patient's nose bridge. In the preferred and exemplary embodiments, the outlet will be positioned so that the drop is released into the inner corner of the eye. In this way, there is little or no structure which is positioned directly over the patient's eye, significantly reducing the negative perception which many patients feel when placing an eyedropper over their eye.

[0011] In the preferred and exemplary embodiments, the cross member will have an arcuate shape with two generally symmetric legs wherein the nose bridge rest is disposed between the legs. One of the legs will provide the lateral extending leg for dispensing the drops, while the other leg may be shorter or truncated so that its primary purpose is to define the symmetric nose bridge which is placed over the patient's nose.

[0012] In further preferred and exemplary embodiments, the outlet in the laterally extending leg will terminate in a nozzle which provides the actual release of the drops being delivered. Still more preferably, the nozzle will be protected within a recess formed in the end of the laterally extending leg, helping to assure that the nozzle remains clean and assuring that the nozzle does not directly connect the eye.

[0013] In further embodiments of the present invention, the attachment is provided as an integral or removable part of a system which further includes the squeeze bottle which carries the desired fluid to be delivered to the eye, typically being an irrigant, a lubricant, a medication, or a combination thereof. The attachment and/or complete systems will typically be provided in sterile packages for delivery to patients.

[0014] According to a further aspect of the present invention, a method for dispensing drops into the eye of a patient comprises aligning a squeeze bottle axially with the bridge of the patient's nose, i.e., so that it is positioned generally between the patient's eye and not aligned over either eye. A drop is dispensed from the bottle in an axial direction toward the bridge of the patient's nose. The drop is then laterally channeled away from the axis so that it is released into the eye, preferably into the inner corner of the eye adjacent to the patient's nose bridge. Aligning typically comprises resting a cross member attached to the squeeze bottle on the patient's nose bridge. Laterally channeling typically comprises diverting the drop through a lumen in the cross member, where a terminal end of the lumen, typically formed as a nozzle, is disposed, over the eye, preferably over the inner corner of the eye.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] Fig. 1 is a side view of a drop dispensing attachment constructed in accordance with the principles of the present invention.

[0016] Fig. 2 is a cross-sectional view of the drop dispensing attachment of Fig. 1.

5 [0017] Fig. 3 is an end view of a laterally extending leg of a cross-member of the drop dispensing apparatus of Figs. 1 and 2 taken along line 3-3 of Fig. 2.

[0018] Figs. 4 and 5 illustrate use of the apparatus of Figs. 1-3 for dispensing drops into an inner corner of a patient's eye.

DETAILED DESCRIPTION OF THE INVENTION

10 [0019] An exemplary drop dispensing attachment 10 constructed in accordance with the principles of the present invention is illustrated in Figs. 1-3. The attachment 10 includes an axial member 12 having an inlet lumen 14 aligned generally along a longitudinal axis 16 of the device. A cross member 18 is attached to the axial member 12 and includes at least one laterally extending leg 20 and usually a second laterally extending leg 22. Preferably, the
15 legs 20 and 22 are arranged in an arcuate geometry to define a nose bridge rest region 24 therebetween. The laterally extending leg 20 includes an outlet lumen 30 which preferably terminates in a nozzle 32 found within a recess 34 in the end of the leg 20. Preferably, the recess 34 terminates in a very thin circumferential segment or "lip" 36 at its lower end which will be positioned above the eye during the dispensing procedure, as described in more detail
20 below. The thin lip 36 is desirable since it reduces the surface tension which might otherwise cause a drop to adhere to the device as it is being released therefrom into the eye.

[0020] The axial member 12 will be adapted to be removably (or in some cases permanently) attached to a squeeze bottle or other droplet dispenser. Although not illustrated in detail, the axial member may be threaded, provided with an interference fit, or otherwise
25 specially adapted to removably receive the squeeze bottle. Alternatively, of course, the attachment 10 could be formed as an integral part of the squeeze bottle or other droplet dispenser.

[0021] The attachment 10 may be formed from a variety of materials, typically being cast or molded from a suitable polymer such as polycarbonate, or silicone. The dimensions are
30 chosen to fit a typical patient, with the lumens having diameters from 0.25 mm to 1 mm, the nozzle diameter being from 0.25 mm to 1 mm, and the distance from the axis 16 to the lip 36

being 15 mm to 25 mm. The materials are preferably malleable and conform to a variety of nasal bridge contours.

5 [0022] Referring now to Figs. 4 and 5, use of the attachment 10 attached to a dispensing bottle 40 for delivering drops to an eye E of a patient will be described. Initially, the patient attaches the attachment 10 to the bottle 40, if it has not already been done. After that, the patient may hold the bottle, or in some cases less desirably the attachment 10, in order to engage the nose bridge region 24 of the attachment against the nose bridge NB of the patient. The assembly of the attachment 10 and squeeze bottle 40 will be held so that the lip 36 of the leg 20 is positioned over the inner corner IC of the eye E. Proper positioning of the assembly
10 will generally be as shown in Fig. 4, where the assembly is generally between the eyes rather than over either eye.

[0023] By squeezing the bottle 40, droplets are dispensed through the attachment 10 and out of the nozzle 32, as illustrated in Fig. 5. The droplets will fall onto the inner wall of the recess 34 and then from the lip 36 and slide into the eye.

15 [0024] Conveniently, if the patient wishes to dispense drops into the other eye, the assembly of the bottle 40 and attachment 10 may simply be turned 180° about the axis 16 so that the dispensing leg 20 now lies over the other eye. The bottle may then be squeezed to deliver lubricant, medication, and/or irrigant to the other eye as just described with respect to the first eye.

20 [0025] While the invention has been described with reference to specific embodiments, the description is illustrative of the invention and is not to be construed as limiting the invention. Various modifications and applications may occur to those skilled in the art without departing from the true spirit and scope of the invention as defined by the appended claims.